

Environmental Health Conditions in California's Portable Classrooms



Air Resources Board
July 24, 2003

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Overview

- Background
- Purpose
- Study Design
- Results
- Recommendations
- Next Steps

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Background

- Mandated by:
 - Governor's Budget, FY 2000-2001
 - Assembly Bill 2872 (Shelley, 2000), Health & Safety Code § 39619.6
- Initial concerns: ventilation, formaldehyde, mold
- Conducted jointly by ARB and DHS
- Field work - Research Triangle Institute

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Public Outreach

- Website
- List serve
- Public input
 - 4 workshops both pre- and post-study
 - 30-day public review of draft report
- Meetings with school districts, manufacturers, and state agencies

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Purpose of Study



- Identify the extent of any potentially unhealthful environmental conditions in portable classrooms in California's public schools
- Recommend preventive actions and remedies, in consultation with stakeholders

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Two - Phase Study Design

- Phase I, Mail Survey (Spring - Summer)
 - 1,181 classrooms in 426 schools
 - Limited sampling of formaldehyde
- Phase II, Field Study (Fall - Winter)
 - 201 classrooms in 67 schools
 - Many indoor and outdoor pollutants measured
 - Indoor conditions and ventilation measured and inspected
- 2 portables & 1 traditional per school
- Representative samples



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Study Results

(For both portable and traditional classrooms, unless specified otherwise)



- Ventilation
- Temperature and Humidity
- Noise
- Air Pollutants
- Floor Dust Contaminants
- Moisture and Mold
- Lighting

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Ventilation

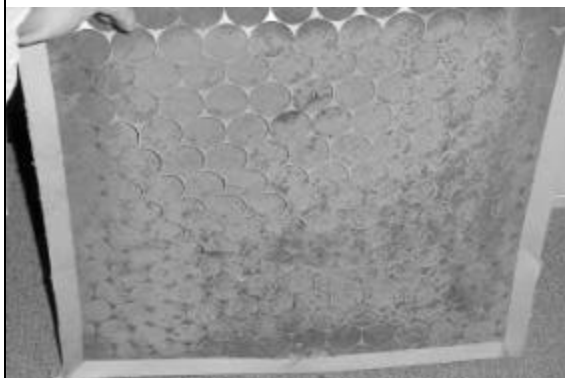


- Inadequate over 40% of the time
- Seriously deficient about 10% of the time
- Teachers often turned off ventilation system due to excessive noise (Port = 60%, Trad = 23%)
- Inspectors frequently found ventilation system problems, especially in portables

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Example: Dirty Air Filter



Temperature and Humidity

- Temperature and humidity often outside acceptable standards ranges
- Some classrooms clearly outside acceptable standards ranges

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Noise

- All rooms exceeded the background acoustics guideline of 35 decibels (ANSI, WHO)
- Many rooms exceeded community nuisance standard of 55 decibels (Port = 50%, Trad = 38%)
- "Best Practices" goal is 45 decibels

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Air Pollutants: Aldehydes

- Formaldehyde levels
 - Higher levels in warmer months, rooms w/ higher humidity, and in newer portables
 - Portables higher than traditionals
- Formaldehyde health concerns
 - 4% exceeded 27 ppb for acute irritant effects
 - All classrooms exceeded ten-in-a-million risk for excess cancer
- Other aldehydes also higher indoors

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Aldehyde sources include new cabinets, bookcases, pressed wood materials



Air Pollutants: Volatile Organic Compounds (VOCs)

- Indoor levels were similar to or less than those in other indoor environments
- Guidelines for acute (immediate) health risks were not exceeded
- Excess cancer risks:
 - Benzene exceeds ten-in-a-million risk
 - Chloroform exceeds one-in-a-million risk
 - However, outdoor air was the major source

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Air Pollutants: Particles

- Highest particle counts were found in portables, especially PM2.5 size
- Likely sources included:
 - motor vehicles (over half the rooms within 50 ft. of vehicle traffic or parking area)
 - carpets and rugs (more frequent in portables)

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Major source of small particles:
vehicle traffic near air intakes



Floor Dust: Metals

- Dust contaminants are mainly a concern for younger children (increased floor contact and exposure)
- Lead levels were elevated
 - Most likely from tracked-in soil or lead paint chips
- Arsenic levels were elevated
 - Natural soil levels are a major source
 - Other possible sources include fertilizer contaminants and wood preservatives

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Peeling paint: potential lead exposure





Floor Dust



- **Pesticides found in all samples**
 - 6 pesticides found in over 80% of the samples
 - 4 more pesticides in over 50% of samples
- **Polycyclic Aromatic Hydrocarbons (PAHs)**
 - Most were found in over 80% of rooms
 - Levels low, but highest in portables
- **Allergens**
 - Cat and dog allergens common; cockroach & dust mite allergens infrequent
 - All levels were low

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Moisture and Mold

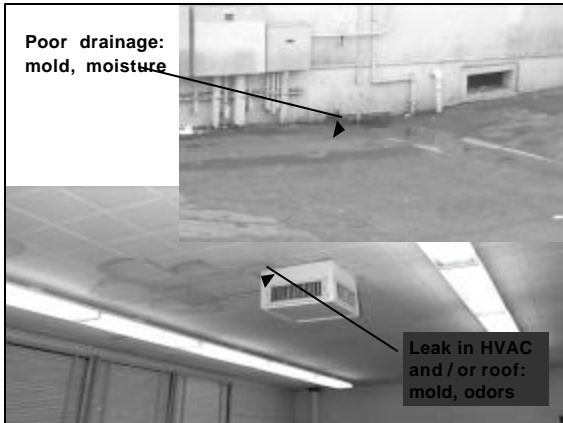


- **Mail survey indicated widespread problems:**
 - 63% of teachers reported musty odors
 - 43% reported current or previous floods / leaks
 - 9% reported visible mold
- **Field observations**
 - 30% of all rooms had water stains on ceilings
 - 17% of all rooms had excess moisture measured in walls, floor, or ceiling
 - 3% of portables had visible mold on ceiling (none in traditionals)

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Poor drainage:
mold, moisture



Leak in HVAC
and / or roof:
mold, odors

Mold in wallboard



Lighting

- About 1/3 of rooms do not meet professional guideline of 50 foot-candles for low-contrast materials
- A small percentage of rooms do not meet guideline of 30 foot-candles for high-contrast materials

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Conclusions

- The majority of schools require improvement in one or more areas:
 - Fresh-air ventilation and noise
 - Sources of contaminants
 - Moisture intrusion
 - Maintenance, repair, or cleaning practices
- Solutions available but require collaborative efforts
- Need to shift from remediation to prevention

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Recommendations

- **Group 1**
 - High Priority Action
 - High Benefit
 - Relatively Low Cost
- **Group 2**
 - Priority Action
 - Longer Term Effort
 - or Higher Costs

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Recommendations

Group 1: High Benefit, Relatively Low Cost

1. **Meet existing state regulations**
 - Cal / OSHA workplace regulations
2. **Conduct health & safety self-assessments**
 - LAUSD checklist
3. **Require Indoor Environmental Quality Management Plans**
 - EPA's Tools for Schools Program

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Recommendations

Group 1: High Benefit, Relatively Low Cost (contd.)

4. **Follow "Best Practices" for new schools**
 - Collaborative for High Performance Schools (CHPS); Tools for Schools
5. **Expand State design review**
 - Division of the State Architect
6. **Assure proper siting of classrooms**
7. **Limit HVAC noise to 45 decibels**

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Recommendations

Group 2: Longer term, or Higher Cost

8. **Assure stable, long-term funding for construction & preventive maintenance**
9. **Develop focused training**
10. **Implement Integrated Pest Management**
11. **Retire older portables**
12. **Require full new building commissioning**

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Recommendations

Group 2: Longer term, or Higher Cost (contd.)

13. **Improve school facility database**
14. **Convene task force on noise**
15. **Develop chemical exposure guidelines or standards for classrooms**
16. **Redesign portables from ground up**

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Next Steps for ARB

- **Send report to Governor & Legislature**
- **Work with stakeholders**
- **Participate in State Relocatables Working Group**
- **Develop formaldehyde ATCM for composite wood products**

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THANK YOU

